REMARKS

The above amendments are necessary to correct minor typographical and grammatical errors and also to delete the multiple dependency of claims 3, 6 and 9, thereby placing such claims in condition for examination and reducing the required PTO filing fee.

Copies of the amended portion of the claims with changes marked therein is attached and entitled "*Version with Markings to Show Changes Made.*"

Respectfully submitted,

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$$PHav\beta = 3W / A$$

Moreover, it is possible to obtain the average particle area of optical particles from the total area A at the threshold β and the number of optical particles C showing the brightness equal to or more than the threshold β. In the present invention, "optical particle" denotes an "independent continuum having a brightness equal to or more than a threshold on a two-dimensional image". When assuming the shape of the above optical particle as a circle, the diameter D of a circle having an area equal to an average particle area is obtained from the following expression.

$$D = \sqrt{(4A / \pi C)}$$

Moreover, the average bottom broadening rate PSav of brightness peaks is obtained from the above PHavβ and D in accordance with the following expression.

$$PSav = D / Phav\beta$$

A brilliance value BV can be approximately calculated by using the brightness-peak average height PHavα obtained as previously described and the average bottom broadening rate PSav of brightness peaks obtained as described above in accordance with the following expression {in the following expression, a is equal to 300 when PHavα is less than 25, equal to 1,050 when PHavα exceeds 45, and equal to a value shown by the expression a = 300 + 37.5× (Phavα-25) when PHavα is equal to a value between 25 and 45}.

$$BV = PHav\alpha + a \cdot PSav$$

When the IPSL value is kept in a range of $0.15 < IPSL < 0.32$, MGR is shown by the following expression.

$$MGR = [IPSL \times (35 / 0.17) - (525 / 17)] / 2$$

When the IPSL value is equal to or less than 0.15, MGR is shown by the following expression.

$$MRG = 0$$

The above MGR value shows an object having no brilliant-material particle feeling as 0 and an object having the highest brilliant-material particle feeling as about 100. Therefore, an object having higher "particle feeling" shows a larger value.

Moreover, it is possible to evaluate a micro-brilliance feeling in accordance with a value (micro-brilliance-feeling index) obtained by indexing a micro-brilliance feeling calculated by the following expression synthetically showing a micro-brilliance feeling in accordance with the above MBV and MGR values.

Micro-brilliance-feeling index =

$$(MGR + \alpha \cdot MBV) / (a + \alpha)$$

As a result of studying many paint plates respectively having a brilliance feeling, it is found that a result well-matching with a micro-brilliance feeling through visual observation can be obtained by setting the above α value to 1.63. The micro-brilliance-feeling index is a value showing an object having no brilliance feeling (object having no glitter or particle feeling) as 0 and an object having the strongest brilliance feeling (object having the strongest glitter and particle feelings) as approximately 100.

selection method is not restricted.

The second color-matching method uses the above steps (5), (6), and (7) as indispensable steps. However, it is permitted to execute the following step (8) after step (7) in order to make a color closer to the reference color.

Step (8)

Step (8) is the same as step (4) in the first color-matching method, in which a color-matching-calculation logic is operated to correct the prospective paint blend selected in step (7) and obtain a corrected blend closer to the reference color.

It is permitted that the second color-matching method further comprises a step of transferring the prospective paint blend obtained in the above step (7) or the corrected blend obtained in step (8) to an electronic balance.

In the case of the first and second color-matching methods, it is possible to transfer a paint blend to an electronic balance through a telephone line or optical cable. It is possible to obtain a color-matched paint by blending through an electronic balance in accordance with the transferred blend. A color-matched paint plate is obtained by painting the color-matched paint to a substrate, it is possible to determine whether the paint is acceptable. When the pain is unacceptable, it is possible to obtain a corrected blend again by operating a color-matching-calculation logic in accordance with the paint blend of the color-matched paint and the color data and micro-brilliance-feeling data of the color-matched painted plate.

Fig. 1 is a process chart showing a paint color-matching method for refinishing a brilliant paint film of an automobile body.

Description of the Example

Hereafter, the present invention is further specifically described by referring to embodiments. However, the present inven-

Table 2

Full-color paint species	Blending quantity (Part by weight)
Silver A (Metallic full color A)	64.38
Silver B (Metallic full color B)	6.50
Blue A (Blue full color A)	0.32
Black A (Black full color A)	0.26
Auxiliary agent A (Aluminum-oriented adjuster A)	18.79
Auxiliary agent B (Aluminum-oriented adjuster B)	9.75

Table 3

Full-color paint species	Bending quantity (Part by weight)
Silver A (Metallic full color A)	47.13
Silver C (Metallic full color C)	42.08
White A (White full color A)	5.02
Yellow A (Yellow full color A)	1.94
Blue B (Blue full color B)	0.25
Blue C (Blue full color C)	0.21
Auxiliary agent B (Aluminum-oriented adjuster A)	3.37

Then, paints of the above blends were applied onto a tin plate and set and thereafter, the refinishing clear paint "RETAN PG2K Clear" made by KANSAI PAINT CO., LTD. was applied onto the paint film up to a film thickness of 50 μm, and then baked for 20 min at 60℃ to form a color-matched paint plate. Colors of the paint plate were measured by the "Van-Van FA sensor" at the above three

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brilliant material was matched through visual observation. The paint color of a color-matched paint plate based on the "SM-001CK07" was not accepted because the micro-brilliance feeling of aluminum powder was considerably separate from the reference color though the color difference from the reference color was small. In general, when a micro-brilliance-feeling index differs by 2 to 3, it is possible to recognize a difference in the glitter feeling and/or particle feeling of a brilliant material through visual observation.

Therefore, a corrected blend was obtained by reading the color-measurement data of the color-matched painted plate and performing fine color-matching calculation by the "Van-Van FA station" and a computer. The corrected blend based on the "SM-001CK01" was a blend obtained by adding a full-color paints shown in Table 6 below to the paint blends shown in Table 2. In the case of the "SM-001CK07", it was impossible to calculate a corrected blend because the color difference was small, codes of ΔL^* of 25° and 75° were inverted, and the color difference was not attenuated even after the corrected-blend calculation in fine color-matching was performed.

Table 6

Full-color paint species	Blending quantity (Part by weight)
Blue A (Blue full color A)	0.05
Black A (Black full color A)	0.11

A color-matched paint plate was formed by performing color-matching with a corrected blend based on the above "SM-001CK012", applying the paint of the above blend to a tin plate, setting it, and thereafter applying a clear paint onto the paint film

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and baking the plate. Colors of the paint plate were measured by the "Van-Van FA sensor" at the above three angles to calculate a color difference. Table 7 shows the color-measured results and the results are close to the color-measurement value of the reference color.

Table 7

	△L*	△a*	△b*	△E*
25°	1.24	-0.07	-0.21	1.26
45°	0.98	-0.11	-0.15	1.00
75°	0.58	-0.17	-0.08	0.61

The micro-brilliance-feeling index of the painted plate was equal to 54.78. Moreover, the paint plate was preferable because colors and micro-brilliance feeling of the plate well matched with those of the reference color through visual evaluation. Therefore, the plate was accepted. Thus, as a result of applying the actually-color-matched paint to an automobile body for refinish and visually performing the color-matching determination for the paint-film surfaces of the refinished paint portion and its vicinity of the automobile body, preferable color-matching was confirmed.

Embodiment 2:

The reference color of the paint film surface of an automobile body coated with a red pearl paint color ("RP-002"; tentative name) was measured by the "Van-Van FA sensor" at three angles of 25°, 45°, and 75°. Table 8 shows the results.

Table 9

Full-color paint species	Blending quantity (Part by weight)
Red A (Red full color A)	31.85
Red B (Red full color B)	30.25
Red C (Red full color C)	25.48
Pearl A (Pearl full color A)	6.37
Pearl B (Pearl full color B)	3.18
Black A (Black full color A)	2.87

Table 10

Full-color paint species	Blending quantity (Part by weight)
Red A (Red full color A)	60.01
Red B (Red full color B)	23.33
Pearl B (Pearl full color B)	13.00
Black A (Black full color B)	3.33
White A (White full color C)	0.33

Then, paints of the above blends were applied onto a tin plate and set and then, the refinishing clear paint "RETAN PG2K Clear" was applied onto the paint films up to a film thickness of approximately 50 μm, thereafter baked for 20 min at 60℃ to form color-matched painted plates. Colors of these paint plates were measured by the "Van-Van FA sensor" at the above three angles to calculate a color difference. Moreover, micro-brilliance feeling was measured to calculate a micro-brilliance feeling index.

A paint plate based on the "RP-002CK01" showed a micro-

brilliance-feeling index of 26.36. Table 11 shows color-measurement results at three angles. A paint plate based on the "RP-002CK12" showed a micro-brilliance-feeling index of 10.82. Table 12 shows color-measurement results at three angles.

Table 11

	△L*	△a*	△b*	△E*
25°	1.05	2.70	0.00	2.90
45°	0.65	1.75	-0.96	2.10
75°	0.16	1.28	-0.54	1.40

Table 12

	△L*	△a*	△b*	△E*
25°	0.29	-0.15	-0.34	0.47
45°	0.19	-0.24	-0.27	0.41
75°	0.19	-0.40	-0.08	0.45

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The paint color of color-matched paint plate based on the "RP002CK01" were not accepted because they were slightly separate from the reference color. However, the micro-brilliance-feeling index showed a value almost equal to that of the reference color and the micro-brilliance feeling of a pearl pigment (brilliant mica powder) serving as a brilliant pearl pigment matched with that of the reference color through visual observation. The paint color of the color-matched paint plate based on the "RP-002CK12" were not accepted because the micro-brilliance-feeling was considerably separate from that of the reference color though the color difference from the

reference color was small.

Therefore, a corrected blend was obtained by reading color-measurement data of the color-matched painted plate and performing fine colorimetric calculation by the "Van-Van FA station" and a computer. The corrected blend based on the "RP-002CK01" was a blend obtained by adding predetermined amounts of full-color paints shown in Table 13 to the paint blend shown in Table 9. Moreover, in the case of the color-matched painted plate based on the "RP-002CK12", it was impossible to perform corrected blend calculation for attenuating color differences at three angles in a good balance because color differences at three angles were too small.

Table 13

Full-color paint species	Blending quantity (Part by weight)
Pearl A (Pearl full color A)	2.46
Pearl B (Pearl full color B)	1.23

A color-matched paint plate was formed by performing color-matching with the corrected blend based on the above "RP-002CK01", applying the paint of the above blend to a tin plate and setting it, and then applying the clear paint onto the paint film and baking the plate similarly to the above described case. Colors of the paint plate were measured by the "Van Van FA sensor" at the above three angles to calculate a color difference. Table 14 shows the color-measurement results and the results were close to the color-measurement value of the reference color.

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Table 14

	△L*	△a*	△b*	△E*
25°	0.54	1.15	-0.14	1.28
45°	0.13	0.78	-1.03	1.30
75°	-0.14	0.36	-0.75	0.84

The micro-brilliance-feeling index of this paint plate showed 26.31. Moreover, because colors and micro-brilliance feeling of the painted plate well matched with the reference color through visual evaluation, the paint plate was accepted. Therefore, as a result of refinish-painting an automobile body with the actually-color-matched paint and visually performing the color-matching determination for the paint-film surfaces of the refinished paint portion and its vicinity of the automobile body, preferable color- matching was confirmed.

painted

Embodiment 3:

The reference color of the paint-film surface of an automobile body coated with a silver metallic paint color having an unknown color number was measured by the "Van-Van FA sensor" at three angles of 25°, 45°, and 75°. Table 15 shows the results.

Table 15

	△L*	a*	b*
25°	100.86	-0.02	4.41
45°	66.74	-0.10	-0.53
75°	45.69	-0.18	-2.73

up to a film thickness of approximately 50 μm and then, baked at 60℃ for 20 min to form a color-matched paint plate. Colors of the painted plate were measured by the "Van-Van A sensor" at the above three angles to calculate a color difference. Moreover, micro-brilliance feeling was also measured to calculate a micro-brilliance-feeling index.

The "SM-002CK05" showed a micro-brilliance-feeling index of 57.38 and Table 18 shows color-measurement results at three angles below.

Table 18

	△L*	△a*	△b*	△E*
25°	1.75	-0.55	0.88	2.03
45°	1.24	-0.24	0.57	1.39
75°	0.89	0.06	0.34	0.95

The "SM-003CK10" showed a micro-brilliance-feeling index of 64.08 and Table 19 shows color-measurement results at three angles below.

Table 19

	△L*	△a*	△b*	△E*
25°	0.75	-0.15	-0.35	0.84
45°	0.26	-0.26	-0.08	0.38
75°	-0.36	0.06	0.34	0.50

Paint color of the color-matched paint plate based on the "SM-002CK05" were not accepted because they were slightly separate

based on the "SM-002CK05", the paint of the above blend was applied onto a tin plate and set, and then the clear paint was applied onto the paint film and baked to form a color-matched paint plate similarly to the above case. Colors of the painted plate were measured by the "Van-Van FA sensor" at the above three angles to calculate color differences. Table 21 shows the color-measurement results and the results were close to the color-measurement value of the reference color.

Table 21

	△L*	△a*	△b*	△E*
25°	0.56	-0.12	0.31	0.65
45°	0.21	0.04	0.07	0.22
75°	-0.13	0.15	-0.08	0.21

The micro-brilliance-feeling index of the painted plate showed 56.98. Moreover, the painted plate was accepted because colors and micro-brilliance feeling of the paint plate well matched with the reference color through visual evaluation. Therefore, as a result of refinish-painting an automobile body with the actually color-matched paint and performing color-matching determination for paint film surfaces of the refinish-painted portion and its vicinity through visual observation, preferable color-matching was confirmed.

A method of the present invention makes it possible to accurately color-match brilliant paints, eliminate the fluctuation of the color-matching accuracy by a color-matching person, and make a color-matching person having less color-matching experience easily and accurately color-match paints.

CLAIMS:

1. A computer color-matching apparatus for paints comprising: (A) a colorimeter, (B) a micro-brilliance-feeling measuring device, and (C) a computer in which a plurality of paint blends, the color data and micro-brilliance-feeling data corresponding to each of the paint blends, and color characteristic data and micro-brilliance-feeling data of a plurality of full-color paints are entered and a color-matching-calculation logic using the paint blends and the data operates.

2. The computer color-matching apparatus according to claim 1, wherein color numbers corresponding to a plurality of paint blends entered in the computer (C) are entered in the computer.

3. The computer color-matching apparatus according to claim 1 ~~or 2~~, wherein a colorimeter (A) is a multiangle colorimeter.

4. A computer color-matching method for brilliant paints of executing the following steps (1) to (3) by using a computer color-matching apparatus constituted of (A) a colorimeter, (B) a micro-brilliance-feeling measuring device, and (C) a computer in which a plurality of paint blends, color data and micro-brilliance-feeling data corresponding to each of the paint blends, and color characteristic data and micro-brilliance-feeling characteristic data of a plurality of full-color paints are entered and a color-matching-calculation logic using the paint blends and the data operates:

(1) a step of measuring a paint film of a reference color to which the color of a paint should be adjusted through color-matching by a colorimeter to obtain color data of the reference color;

(2) a step of measuring the paint film of a reference color to which the color of a paint should be adjusted through color-matching by a micro-brilliance-feeling measuring device to obtain micro-brilliance-feeling data of the reference color; and

(3) a step of comparing the color data and micro-brilliance-feeling data of the reference color with color data and micro-

brilliance-feeling data corresponding to paint blends previously entered in a computer, indexing the degree of matching of the color and micro-brilliance feeling of the entered paint blends, and selecting a prospective paint blend.

5. The computer color-matching method according to claim 4, further executing (4) a step of correcting a selected paint blend by a color-matching-calculation logic after the step (3) to obtain a corrected blend closer to a reference color.

6. The computer color-matching method according to claim 4 ~~or 5~~, wherein the prospective paint blend obtained in step (3) or the corrected blend obtained in step (4) is transferred to an electronic balance.

7. A computer color-matching method of executing the following steps (5) to (7) by using a computer color-matching apparatus constituted of (A) a colorimeter, (B) a micro-brilliance-feeling measuring device, and (C) a computer in which a plurality of color numbers, paint blends corresponding to the color numbers, color data and micro-brilliance-feeling data corresponding to each of the paint blends, and color characteristic data and micro-brilliance-feeling data of a plurality of full-color paints, and color-matching-calculation logic using the paint blends and the data operates:

(5) a step of measuring a paint film of a reference color to which a paint color should be adjusted through color-matching by a colorimeter to obtain the color data of the reference color;

(6) a step of measuring the paint film of the reference color to which the paint color should be adjusted through color-matching by a micro-brilliance-feeling measuring device to obtain the micro-brilliance-feeling data of the reference color; and

(7) a step of selecting color data and micro-brilliance-feeling data of at least one paint blend having the same color number as the preset color number of the reference color, comparing the

color data and micro-brilliance-feeling data of the selected paint blend with the color data and micro-brilliance-feeling data of the reference color, indexing the degree of matching of the color and micro-brilliance feeling of the selected paint blend, and selecting a prospective paint blend.

8. The computer color-matching method according to claim 7, further executing (8) a step of correcting the selected prospective paint blend by a color-matching-calculation logic to obtain a corrected paint blend closer to the reference color.

9. The computer color-matching method according to claim 7 ~~or 8~~, wherein the prospective paint blend obtained in step (7) or the corrected blend obtained in step (8) is transferred to an electronic balance.

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$$PHav\beta = 3W / A$$

Moreover, it is possible to obtain the average particle area of optical particles from the total area A at the threshold β and the number of optical particles C showing the brightness equal to or more than the threshold β. In the present invention, "optical particle" denotes an "independent continuum having a brightness equal to or more than a threshold on a two-dimensional image". When assuming the shape of the above optical particle as a circle, the diameter D of a circle having an area equal to an average particle area is obtained from the following expression.

$$D = \sqrt{(4A / \pi C)}$$

Moreover, the average bottom broadening rate PSav of brightness peaks is obtained from the above PHavβ and D in accordance with the following expression.

$$PSav = D / PHav\beta$$

A brilliance value BV can be approximately calculated by using the brightness-peak average height PHavα obtained as previously described and the average bottom broadening rate PSav of brightness peaks obtained as described above in accordance with the following expression {in the following expression, a is equal to 300 when PHavα is less than 25, equal to 1,050 when PHavα exceeds 45, and equal to a value shown by the expression $a = 300 + 37.5 \times (PHav\alpha - 25)$ when PHavα is equal to a value between 25 and 45}.

$$BV = PHav\alpha + a \cdot PSav$$

When the IPSL value is kept in a range of $0.15 < IPSL < 0.32$, MGR is shown by the following expression.

$$MGR = [IPSL \times (35 / 0.17) - (525 / 17)] / 2$$

When the IPSL value is equal to or less than 0.15, MGR is shown by the following expression.

$$MRG = 0$$

The above MGR value shows an object having no brilliant-material particle feeling as 0 and an object having the highest brilliant-material particle feeling as about 100. Therefore, an object having higher "particle feeling" shows a larger value.

Moreover, it is possible to evaluate a micro-brilliance feeling in accordance with a value (micro-brilliance-feeling index) obtained by indexing a micro-brilliance feeling calculated by the following expression synthetically showing a micro-brilliance feeling in accordance with the above MBV and MGR values.

$$\text{Micro-brilliance-feeling index} = (MGR + \alpha \cdot MBV) / (1 + \alpha)$$

As a result of studying many painted plates respectively having a brilliance feeling, it is found that a result well-matching with a micro-brilliance feeling through visual observation can be obtained by setting the above α value to 1.63. The micro-brilliance-feeling index is a value showing an object having no brilliance feeling (object having no glitter or particle feeling) as 0 and an object having the strongest brilliance feeling (object having the strongest glitter and particle feelings) as approximately 100.

selection method is not restricted.

The second color-matching method uses the above steps (5), (6), and (7) as indispensable steps. However, it is permitted to execute the following step (8) after step (7) in order to make a color closer to the reference color.

Step (8)

Step (8) is the same as step (4) in the first color-matching method, in which a color-matching-calculation logic is operated to correct the prospective paint blend selected in step (7) and obtain a corrected blend closer to the reference color.

It is permitted that the second color-matching method further comprises a step of transferring the prospective paint blend obtained in the above step (7) or the corrected blend obtained in step (8) to an electronic balance.

In the case of the first and second color-matching methods, it is possible to transfer a paint blend to an electronic balance through a telephone line or optical cable. It is possible to obtain a color-matched paint by blending through an electronic balance in accordance with the transferred blend. A color-matched painted plate is obtained by painting the color-matched paint to a substrate, it is possible to determine whether the paint is acceptable. When the pain is unacceptable, it is possible to obtain a corrected blend again by operating a color-matching-calculation logic in accordance with the paint blend of the color-matched paint and the color data and micro-brilliance-feeling data of the color-matched painted plate.

Fig. 1 is a process chart showing a paint color-matching method for refinishing a brilliant paint film of an automobile body.

Description of the Example

Hereafter, the present invention is further specifically described by referring to embodiments. However, the present inven-

Table 2

Full-color paint species	Blending quantity (Part by weight)
Silver A (Metallic full color A)	64.38
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Auxiliary agent A (Aluminum-oriented adjuster A)	18.79
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Table 3

Full-color paint species	Bending quantity (Part by weight)
Silver A (Metallic full color A)	47.13
Silver C (Metallic full color C)	42.08
White A (White full color A)	5.02
Yellow A (Yellow full color A)	1.94
Blue B (Blue full color B)	0.25
Blue C (Blue full color C)	0.21
Auxiliary agent B (Aluminum-oriented adjuster A)	3.37

Then, paints of the above blends were applied onto a tin plate and set and thereafter, the refinishing clear paint "RETAN PG2K Clear" made by KANSAI PAINT CO., LTD. was applied onto the paint film up to a film thickness of 50 μm, and then baked for 20 min at 60℃ to form a color-matched painted plate. Colors of the painted plate were measured by the "Van-Van FA sensor" at the above three

brilliant material was matched through visual observation. The paint color of a color-matched painted plate based on the "SM-001CK07" was not accepted because the micro-brilliance feeling of aluminum powder was considerably separate from the reference color though the color difference from the reference color was small. In general, when a micro-brilliance-feeling index differs by 2 to 3, it is possible to recognize a difference in the glitter feeling and/or particle feeling of a brilliant material through visual observation.

Therefore, a corrected blend was obtained by reading the color-measurement data of the color-matched painted plate and performing fine color-matching calculation by the "Van-Van FA station" and a computer. The corrected blend based on the "SM-001CK01" was a blend obtained by adding a full-color paints shown in Table 6 below to the paint blends shown in Table 2. In the case of the "SM-001CK07", it was impossible to calculate a corrected blend because the color difference was small, codes of ΔL^* of 25° and 75° were inverted, and the color difference was not attenuated even after the corrected-blend calculation in fine color-matching was performed.

Table 6

Full-color paint species	Blending quantity (Part by weight)
Blue A (Blue full color A)	0.05
Black A (Black full color A)	0.11

A color-matched painted plate was formed by performing color-matching with a corrected blend based on the above "SM-001CK012", applying the paint of the above blend to a tin plate, setting it, and thereafter applying a clear paint onto the paint film

and baking the plate. Colors of the painted plate were measured by the "Van-Van FA sensor" at the above three angles to calculate a color difference. Table 7 shows the color-measured results and the results are close to the color-measurement value of the reference color.

Table 7

	△L*	△a*	△b*	△E*
25°	1.24	-0.07	-0.21	1.26
45°	0.98	-0.11	-0.15	1.00
75°	0.58	-0.17	-0.08	0.61

The micro-brilliance-feeling index of the painted plate was equal to 54.78. Moreover, the painted plate was preferable because colors and micro-brilliance feeling of the plate well matched with those of the reference color through visual evaluation. Therefore, the plate was accepted. Thus, as a result of applying the actually-color-matched paint to an automobile body for refinish and visually performing the color-matching determination for the paint-film surfaces of the refinished paint portion and its vicinity of the automobile body, preferable color-matching was confirmed.

Embodiment 2:

The reference color of the paint film surface of an automobile body coated with a red pearl paint color ("RP-002"; tentative name) was measured by the "Van-Van FA sensor" at three angles of 25°, 45°, and 75°. Table 8 shows the results.

Table 9

Full-color paint species	Blending quantity (Part by weight)
Red A (Red full color A)	31.85
Red B (Red full color B)	30.25
Red C (Red full color C)	25.48
Pearl A (Pearl full color A)	6.37
Pearl B (Pearl full color B)	3.18
Black A (Black full color A)	2.87

Table 10

Full-color paint species	Blending quantity (Part by weight)
Red A (Red full color A)	60.01
Red B (Red full color B)	23.33
Pearl B (Pearl full color B)	13.00
Black A (Black full color B)	3.33
White A (White full color C)	0.33

Then, paints of the above blends were applied onto a tin plate and set and then, the refinishing clear paint "RETAN PG2K Clear" was applied onto the paint films up to a film thickness of approximately 50 μm, thereafter baked for 20 min at 60℃ to form color-matched painted plates. Colors of these painted plates were measured by the "Van-Van FA sensor" at the above three angles to calculate a color difference. Moreover, micro-brilliance feeling was measured to calculate a micro-brilliance-feeling index.

A painted plate based on the "RP-002CK01" showed a micro-

brilliance-feeling index of 26.36. Table 11 shows color-measurement results at three angles. A painted plate based on the "RP-002CK12" showed a micro-brilliance-feeling index of 10.82. Table 12 shows color-measurement results at three angles.

Table 11

	△L*	△a*	△b*	△E*
25°	1.05	2.70	0.00	2.90
45°	0.65	1.75	-0.96	2.10
75°	0.16	1.28	-0.54	1.40

Table 12

	△L*	△a*	△b*	△E*
25°	0.29	-0.15	-0.34	0.47
45°	0.19	-0.24	-0.27	0.41
75°	0.19	-0.40	-0.08	0.45

The paint color of color-matched painted plate based on the "RP002CK01" were not accepted because they were slightly separate from the reference color. However, the micro-brilliance-feeling index showed a value almost equal to that of the reference color and the micro-brilliance feeling of a pearl pigment (brilliant mica powder) serving as a brilliant pearl pigment matched with that of the reference color through visual observation. The paint color of the color-matched painted plate based on the "RP-002CK12" were not accepted because the micro-brilliance-feeling was considerably separate from that of the reference color though the color difference from the

reference color was small.

Therefore, a corrected blend was obtained by reading color-measurement data of the color-matched painted plate and performing fine colorimetric calculation by the "Van-Van FA station" and a computer. The corrected blend based on the "RP-002CK01" was a blend obtained by adding predetermined amounts of full-color paints shown in Table 13 to the paint blend shown in Table 9. Moreover, in the case of the color-matched painted plate based on the "RP-002CK12", it was impossible to perform corrected blend calculation for attenuating color differences at three angles in a good balance because color differences at three angles were too small.

Table 13

Full-color paint species	Blending quantity (Part by weight)
Pearl A (Pearl full color A)	2.46
Pearl B (Pearl full color B)	1.23

A color-matched painted plate was formed by performing color-matching with the corrected blend based on the above "RP-002CK01", applying the paint of the above blend to a tin plate and setting it, and then applying the clear paint onto the paint film and baking the plate similarly to the above described case. Colors of the painted plate were measured by the "Van-Van FA sensor" at the above three angles to calculate a color difference. Table 14 shows the color-measurement results and the results were close to the color-measurement value of the reference color.

Table 14

	△L*	△a*	△b*	△E*
25°	0.54	1.15	-0.14	1.28
45°	0.13	0.78	-1.03	1.30
75°	-0.14	0.36	-0.75	0.84

The micro-brilliance-feeling index of this painted plate showed 26.31. Moreover, because colors and micro-brilliance feeling of the painted plate well matched with the reference color through visual evaluation, the painted plate was accepted. Therefore, as a result of refinish-painting an automobile body with the actually-color-matched paint and visually performing the color-matching determination for the paint-film surfaces of the refinished paint portion and its vicinity of the automobile body, preferable color- matching was confirmed.

Embodiment 3:

The reference color of the paint-film surface of an automobile body coated with a silver metallic paint color having an unknown color number was measured by the "Van-Van FA sensor" at three angles of 25°, 45°, and 75°. Table 15 shows the results.

Table 15

	△L*	a*	b*
25°	100.86	-0.02	4.41
45°	66.74	-0.10	-0.53
75°	45.69	-0.18	-2.73

up to a film thickness of approximately 50 μm and then, baked at 60℃ for 20 min to form a color-matched painted plate. Colors of the painted plate were measured by the "Van-Van FA sensor" at the above three angles to calculate a color difference. Moreover, micro-brilliance feeling was also measured to calculate a micro-brilliance-feeling index.

The "SM-002CK05" showed a micro-brilliance-feeling index of 57.38 and Table 18 shows color-measurement results at three angles below.

Table 18

	△L*	△a*	△b*	△E*
25°	1.75	-0.55	0.88	2.03
45°	1.24	-0.24	0.57	1.39
75°	0.89	0.06	0.34	0.95

The "SM-003CK10" showed a micro-brilliance-feeling index of 64.08 and Table 19 shows color-measurement results at three angles below.

Table 19

	△L*	△a*	△b*	△E*
25°	0.75	-0.15	-0.35	0.84
45°	0.26	-0.26	-0.08	0.38
75°	-0.36	0.06	0.34	0.50

Paint color of the color-matched painted plate based on the "SM-002CK05" were not accepted because they were slightly separate

based on the "SM-002CK05", the paint of the above blend was applied onto a tin plate and set, and then the clear paint was applied onto the paint film and baked to form a color-matched painted plate similarly to the above case. Colors of the painted plate were measured by the "Van-Van FA sensor" at the above three angles to calculate color differences. Table 21 shows the color-measurement results and the results were close to the color-measurement value of the reference color.

Table 21

	△L*	△a*	△b*	△E*
25°	0.56	-0.12	0.31	0.65
45°	0.21	0.04	0.07	0.22
75°	-0.13	0.15	-0.08	0.21

The micro-brilliance-feeling index of the painted plate showed 56.98. Moreover, the painted plate was accepted because colors and micro-brilliance feeling of the painted plate well matched with the reference color through visual evaluation. Therefore, as a result of refinish-painting an automobile body with the actually color-matched paint and performing color-matching determination for paint film surfaces of the refinish-painted portion and its vicinity through visual observation, preferable color-matching was confirmed.

A method of the present invention makes it possible to accurately color-match brilliant paints, eliminate the fluctuation of the color-matching accuracy by a color-matching person, and make a color-matching person having less color-matching experience easily and accurately color-match paints.